



# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AFBJAS/P9096WO		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/03403	International filing date (day/month/year) 06.08.2003	Priority date (day/month/year) 13.08.2002	
International Patent Classification (IPC) or both national classification and IPC C10G2/00			
Applicant MID-AMERICA COMMERCIALIZATION CORP. et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 6 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand 12.03.2004		Date of completion of this report 09.12.2004	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 apmu d Fax: +49 89 2399 - 4465		Authorized Officer Rumbo, A Telephone No. +49 89 2399-8407 	

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/GB 03/03403**

**1. Basis of the report**

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-30 as originally filed

**Claims, Numbers**

1-29 filed with telefax on 07.09.2004

**Drawings, Sheets**

1/3-3/3 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/GB 03/03403**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1-18
	No: Claims	19-29
Inventive step (IS)	Yes: Claims	
	No: Claims	1-29
Industrial applicability (IA)	Yes: Claims	1-29
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

## SECTION V

### 1. STATE OF THE ART AND NOVELTY OF THE CLAIMED SUBJECT-MATTER

#### 1.1 The claimed apparatus of claim 19 comprises:

- (a) a syngas generation system (for reacting methane and/or oxygen containing gas)
- (b) a syngas conversion system (for converting syngas into HC or oxygenates)
- (c) a cryogenic separation system (separating  $H_2$  from cryogenic liquid comprising CO)
- (d) a cryogenic distillation column (for separating CO from cryogenic liquid)

All the elements of the claim (a to d above) are known and (see, e.g. D1=US-A-4 782 097 and documents cited at page 2, lines 9-14 of the description of the present application as far as all the elements of the cryogenic distillation column are concerned), provided that the intended use of the apparatus either does not add a technical feature to the claimed subject matter or does not establish any connection between them, the novelty of the independent apparatus claim 19 and the rest of the claims 20-29 (containing well known isolated elements with known technical features as methane wash columns of claims 20 and 26, hydrogenation system of claim 21, conduit means of claim 22 to 24, membrane separation systems of claim 25, hydrogen recycle of claim 27 and reactors of claims 28-29) are all known from either D1 or the rest of the documents of the prior art cited at page 2, lines 9-14 of the description of the present application and cannot be considered novel.

**Claims 19-29 do not meet therefore the requirements of Article 33(2) PCT.**

#### 1.2 The wording of independent claim 1 comprises:

- (a) a process for generating syngas (comprises CO and  $H_2$ ) from methane and either steam and/or an oxidant gas comprising oxygen,
- (b) a conversion process for producing higher molecular weight hydrocarbons or oxygenates,
- (c) removing offgas comprising unreacted hydrogen and unreacted CO from said syngas conversion process (b),
- (d) separating unreacted hydrogen from the offgas of (c) above via a cryogenic separation process to produce hydrogen product substantially free from unreacted CO and a first cryogenic liquid comprising unreacted CO.
- (e) the first cryogenic liquid comprising unreacted CO is treated in a cryogenic distillation column to produce separated CO and a liquid which is substantially CO-free.

1.3 The novelty of the claimed subject-matter (claim 1) has been made novel in view of D1=US-A-4 782 097, due to the introduction of the terms of claim 5 within the wording of originally filed claim 1, i.e. due to the presence of **two step cryogenic separations one of which contains a distillation column** instead of the more general description of

cryogenic step according to the chemical Engineering Progress February 1980 pages 72-79 and October 1984 pages 53-56.

Claims 1-18 meet the requirements of novelty of Article 33(2) PCT in view of D1.

1.4 The claimed subject-matter has also been made novel in view of the rest of documents of the prior art cited in the search report. In particular D2= US-A-5 173 513 disclosing a process for the obtention of methanol from syngas in which both a hydrogen rich stream (see 94.19% v/v at table 2) and a CO rich stream (see 33.55%v/v CO at table 2) are recycled to be mixed at points 114 and respectively 115 to the gas obtained from the syngas generator. The claimed process differs from that of D2 due to the fact that it uses a combination of a non defined cryogenic process giving pure Hydrogen (purity unknown) and a cryogenic liquid (composition unknown) which is again separated in a cryogenic distillation column into carbon monoxide (purity unknown) and carbon monoxide free cryogenic liquid) instead of the apparatus 152 cryogenic separation (see col.12, line 21) and dry purifier absorption tower 144).

Claims 1-18 meet the requirements of novelty of Article 33(2) PCT in view of D2.

2. The claimed subject-matter does not meet the inventive step requirements of Article 33(3) EPC.

2.1 D1 is not relevant concerning the inventive step of the claimed subject-matter insofar as no CO recycling is disclosed therein. On the contrary purge gas can be used as a residual gas (see residual gas of fig 1. and item 17 of figures 4. and 5.) or as a purge gas (item 15 of figure 3)

2.2 On the contrary, D2 is of the utmost relevance as far as the inventive step of the claimed subject-matter is concerned.

In fact, the claimed subject-matter cannot be considered inventive insofar as separating CO rich stream from H<sub>2</sub>-rich stream is known either via the process of D2 or via a cryogenic process including a cryogenic column of D3=US-A-4 217 759 (see items 24, 124, 224, 324 of figures 1 to 4, table A, claims 1 to10) cited at page 2, lines 9-14 of the description of the present application.

Merely using a separation of a stream of CO of unknown purity from a stream of H<sub>2</sub> of unknown purity cannot constitute the basis of any inventive step in view of either D2 taken alone or even in view of its combination with D3.

D2 taken alone explicitly solves a problem of adjusting the CO and H<sub>2</sub> contents of the feedstock to the syngas conversion unit by recirculating a CO rich stream and a H<sub>2</sub> rich

stream.

On the contrary, the claimed subject-matter merely separates the stream of CO (of unknown composition or purity) from that of H<sub>2</sub> (of unknown purity) without undertaking anything therewith. Of course such cryogenic separations are well known from D3 and cannot constitute per se the basis of any kind of inventive step argument.

2.3 In the absence of the evidence that a technical problem can be solved as a consequence of the presence of a differentiating technical feature within the wording of the independent claim in a non obvious way which could not have been solved in an obvious way by the technical features of D2 or the rest of documents of the prior art (e.g. D3) the inventive step of the claimed subject-matter cannot be acknowledged. In fact modifications which do not solve any technical problem can be considered obvious modifications of the prior art. This is the case of the presently claimed subject-matter which independent claim 1 does not solve any technical problem in view of D2 or D2+D3 and does not meet therefore the requirements of Article 33(3) PCT.